



RVM-I Rotary Random & Sine Shaker

Developed for Bearing Acoustics Testing

GHI's Rotary Vibration Machine, Model I is an important new product. It was first developed to study brinelling damage to hard disk drive motor bearings that occurs in handling environments (see reverse for discussion). It features reliable performance across the frequency spectrum of 2 Hz to 6.5 KHz, and is exceptional for transportation tests with spectra from 5 Hz to 500 Hz. Performance is better than +/- 3 dB. One reason the RVM-I excels is that it uses a high force actuator that provides large low frequency rotational displacements; outer radius = +/- 0.5 inch (+/- 7 degrees).

The system utilizes a 50 lbf random - 70 lbf peak sine actuator and 500 VA power amplifier, with frequency range from DC to 6,500 Hz. The RVM-I is furnished with or without a controller package. The standard controller provides 1 channel input (4 channel optional) for both sine and random operation. The controller is installed in an IBM compatible PC running Windows. A turnkey RVM-I system is complete with all shaker components, 100 mV/g accelerometer, PC, monitor, keyboard, mouse, and printer plus all required cables. Fixtures for customer products are not included. The figure below illustrates the major components of the turnkey system except the PC.

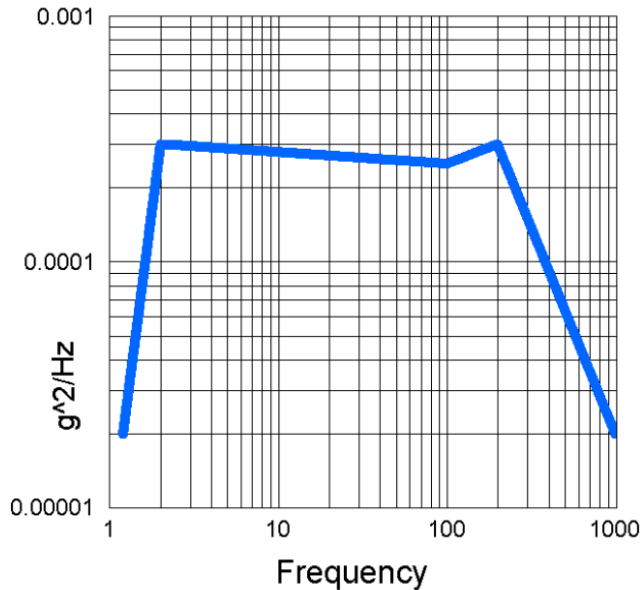


GHI Systems RVM-I rotary random and sine shaker system. The complete turnkey system includes all required components except fixtures.

Key System Specifications

Capacity, non reactive mass:	5 lbs 2.3 kg, allows stacked drives to 5" above table
Actuator force, with cooling, random/sine:	50/75 lbf - 68/102 Nm
without cooling, random/sine:	28/40 lbf - 38/54 Nm
Frequency ranges:	Random
	Sine
Displacement at outer radius:	6 Hz to 2 KHz or 2 Hz to 500 Hz (Set by Controller)
Weight with Actuator:	2 Hz to 5000 Hz
Dimensions:	+/- 0.5" max, +/- 7 degrees with furnished stinger
Table:	88 lbs. 40 kg
Mounting Hole Pattern:	20" w x 16" d x 9" h, 508 mm x 406 mm x 228 mm
	8" dia. 203.2 mm
	24 ea M6 On 45 degree radials, 1" centers

Typical Controller Spectrum



Basic Transportation Rotary Random Vibration Test

A major hard disk manufacturer has found that rotary motion of the media stack occurs during transportation of drives. This motion is very small since there are no NET rotational vectors applied to the product. The motor bearings supporting the media are under load and the small rotary motions cause the bearing balls to partially rotate and thereby 'wipe' the lubricant from the bearing-race interface. The bearing loads are often high enough to cause wear at the point of contact between the non-lubricated ball and the race. If the wear is significant, then a form of brinelling occurs which results in objectionable bearing noise, one cause of drive rejection.

A test was developed to simulate and accelerate the effects of the environmental rotational random vibration on test drives. This involves low frequency, low amplitude

random vibration about the disk media axis. The controller spectrum is either duplicated from field data measurements, or from specifications such as those in ASTM D-10 practices. A typical RMS value for the control spectrum is less than 0.6 g. The test is performed for a period of time that provides assurance that the degree of field excitation has been duplicated. Displacement is an important concern. For example, 0.3" at the outer radius of the table translates to 0.01875" at the ball race of a 0.5" bearing. Smaller displacement would not be as effective, but at the same time it should not be too large, otherwise the bearing balls will redistribute the lubricant and nullify the test. Large displacement is a function of low frequency capability provided by the RVM-I linear ED actuator.

Ordering Options:

The RVM-I can be ordered with or without controller.

The **Turnkey** System **includes** the controller Order P/N: 420-01

As a turnkey with controller, you receive everything pictured on the reverse side. (Not shown is the PC with the controller hardware card installed, or accelerometer and cables).

The **Basic System** is **without** the controller Order P/N: 420-02

The RVM-I is also offered without controller card, software, PC, monitor, printer, keyboard, 100 mV/g accelerometer, accelerometer cable, and mouse. A 100 mV/g accelerometer is recommended. The basic RVM-I is delivered complete with ED actuator and power amplifier. The ED actuator was 'designed in' and is not replaceable by other units because of fittings,. The power amplifier was designed to match the actuator.



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